WHAT IS CLAIMED IS:

1. An electron-emitting device comprising:

a substrate;

first and second carbon films laid with a first gap in between on a surface of the substrate; and

first and second electrodes electrically connected to said first carbon film and to said second carbon film, respectively,

wherein a narrowest gap portion between said first carbon film and second carbon film in said first gap is located above the surface of the substrate, and

wherein said substrate has a depressed portion, at least, in said first gap.

2. An electron-emitting device comprising:

a substrate;

a carbon film having a first gap on a surface of the substrate; and

first and second electrodes electrically connected to said carbon film,

wherein a narrowest gap portion in said first gap is located above the surface of the substrate, and

wherein said substrate has a depressed portion, at least, in said first gap.

3. The electron-emitting device according to Claim 1 or 2, wherein said depressed portion comprises

carbon.

4. The electron-emitting device according to Claim 1 or 2, wherein said carbon film is connected to said electrodes via an electrically conductive, thin film placed on the surface of the substrate between said first and second electrodes.

5. The electron-emitting device according to Claim 4, wherein said conductive, thin film has a second gap and said first gap is located in the second gap.

6. The electron-emitting device according to Claim 4, wherein in a direction normal to the surface of the substrate, said narrowest gap portion is located at a higher position above the surface of said substrate than a surface of said conductive, thin film.

7. The electron-emitting device according to Claim 5, wherein in a direction normal to the surface of the substrate, said narrowest gap portion is located at a higher position above the surface of said substrate than a surface of said conductive, thin film.

8. The electron-emitting device according to Claim 1 or 2, wherein said first gap comprises a

portion whose distance is not more than 10 nm.

9. The electron-emitting device according to Claim 8, wherein said first gap comprises a portion whose distance is 1 to 5 nm.

10. The electron-emitting device according to Claim 1 or 2, wherein in a direction normal to the surface of the substrate, the thickness of the carbon film present on an extension line connecting the narrowest portion of said first gap is not more than 100 nm.

11. An electron source in which a plurality of electron-emitting devices are arrayed on a substrate, wherein said electron-emitting devices are those as set forth in Claim 1 or 2.

12. An image-forming apparatus comprising an electron source, and an image-forming member for forming an image under irradiation of electrons emitted from the electron source, wherein said electron source is the one as set forth in Claim 11.